Executive Summary

Note: This is an update to the Seasonal Fire Weather/Fire Danger Outlook issued 18 June 2003.

Long-term precipitation deficits remain the dominant factor in shaping the 2003 fire season for the Great Basin. Historic records of energy release component (ERC) and 1000-hour fuel moisture during the 2002 fire season will be repeated, and possibly exceeded, this summer. Drought conditions continue to plague the area, despite near normal to slightly above normal March, April, and early May precipitation for much of the Basin. The moist spring weather contributed to a significant crop of annual grasses, an element that has been missing from the fire equation over the past three to four years across much of the Basin. This has increased both the volume and continuity of fine fuels, resulting in a greater potential for larger, more intense fires, especially in the rangelands. Additionally, increased tree and shrub mortality from drought stress and insect infestations will contribute to the extreme fuels condition.

Based on an outlook of warmer than normal temperatures and near normal precipitation for the summer (June-July-August), the Great Basin will likely experience **above normal fire potential over southern Idaho, northern and central Nevada including the Sierra Front, extreme southeastern Nevada, the Arizona Strip, and most of Utah.** Fire potential is expected to be normal over most of southern Nevada, central Idaho, the Bridger-Teton, and the southeastern corner of Utah.

The main factors that contributed to our conclusions are:

- Long-term drought conditions;
- Significant increases in fine fuels, especially in the rangelands;
- A repeat of 2002's extreme fuel conditions;
- Increasing tree and shrub mortality caused by drought, insects, and disease.

Changes made from the previous outlook include:

- Narrowed the window in our scenarios
- Accounted for more fine fuel growth than anticipated
- Expanded the area of above normal potential over Utah, southwest Idaho, and much of northern and central Nevada.

This outlook is our best estimate of expected conditions for the upcoming fire season.

Current Conditions

Weather and Climate. Precipitation since the end of the 2002 fire season has been normal to a little above normal for most of the Great Basin (Figure 1). However, this has done little to ameliorate long-term precipitation deficits that are now entering the fifth year. Analyses of the 24- and 36-month periods ending May, 2003 (Figure 2), illustrate how water shortages continue to plague most of the Intermountain West.

The period from July, 2002, to April, 2003, was characterized by an El Niño episode, a warming of the surface waters in the equatorial central Pacific Ocean and off the coast of South America. Current indications suggest a shift to a La Niña episode, a cooling of the equatorial Pacific. While there is evidence to suggest that these episodes can cause large swings in temperature and precipitation patterns in the United States, there are no strong correlations between El Niño/La Niña events and weather patterns over the Great Basin. Nevertheless, it is unlikely that, if the current La Niña episode persists, it will have any impacts until the fall.

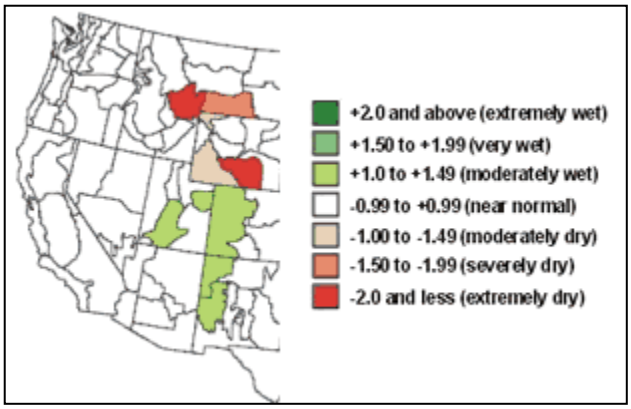

Figure 1. Standardized Precipitation Index (SPI) through May, 2003 for the previous months. (*from National Drought Mitigation Center, USDA*)

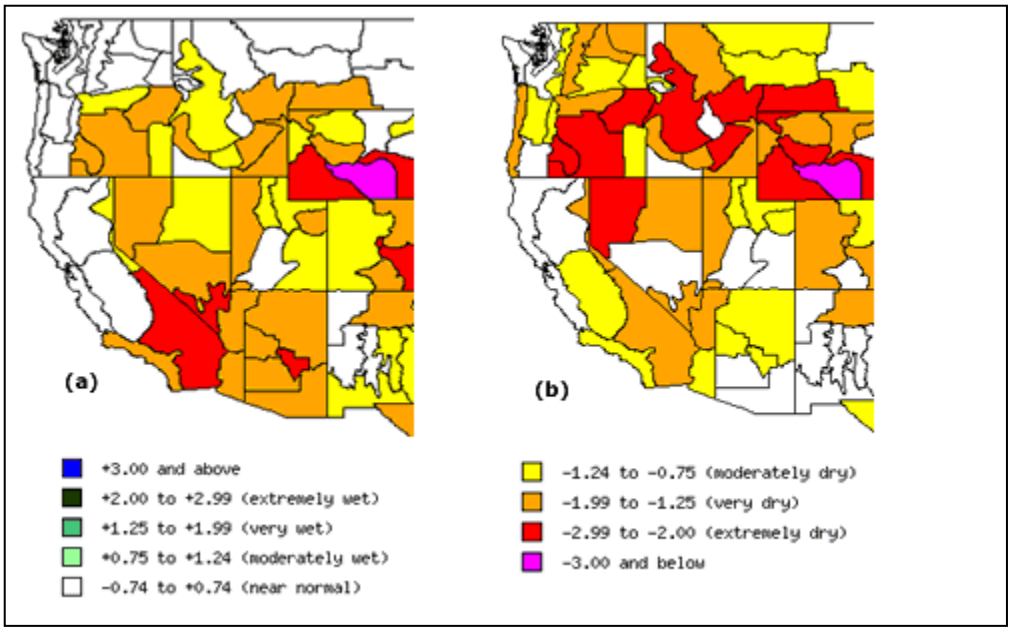

Figure 2. Standardized Precipitation Index (SPI) through May, 2003 for previous (a) 24 months, and (b) 36 months. (*from Desert Research Institute, Western Regional Climate Center*)

Above to much above normal temperatures during the 3-month period of March-April-May (Figure 3) took a toll on snowpacks. Earlier than normal snowmelt reduced the snowpack significantly, leaving many areas well below normal (Figure 4). The loss of available moisture from snowmelt later in the spring was tempered by normal to above normal precipitation. However, the prolonged drought has created soils that are slow to respond to precipitation. The more evenly spread out rain events during the period were beneficial to vegetation that responds well to shallow soil moisture, but plants that require deeper level moisture continued to suffer.

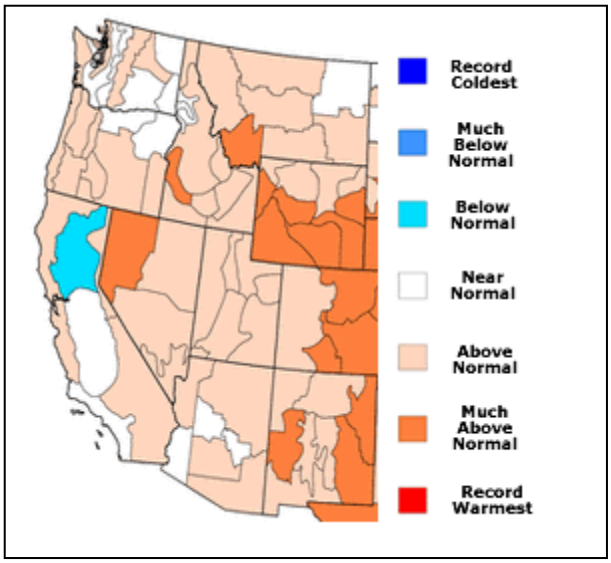

Figure 3. Temperature anomaly for March-April-May, 2003. (*from National Climatic Data Center, NOAA*)

Fuels Analysis. The combination of a warm and normal-to-wet spring gave rise to an early green-up across most of the Great Basin. Additionally, grass germination was far greater than had occurred in the previous three to four years, providing continuous, heavy new growth in the rangelands. Fuel loadings range from 600 lbs/acre to 1.5 tons/acre; in some areas, it is a high as 2.5 tons/acre. By the first week of June, green-up had occurred at virtually all elevations and curing, aided by very hot, dry weather at the end of May, was well underway at elevations up to about 7000 feet. It is expected that curing of fine fuels will be nearly complete at all elevations by the end of June.

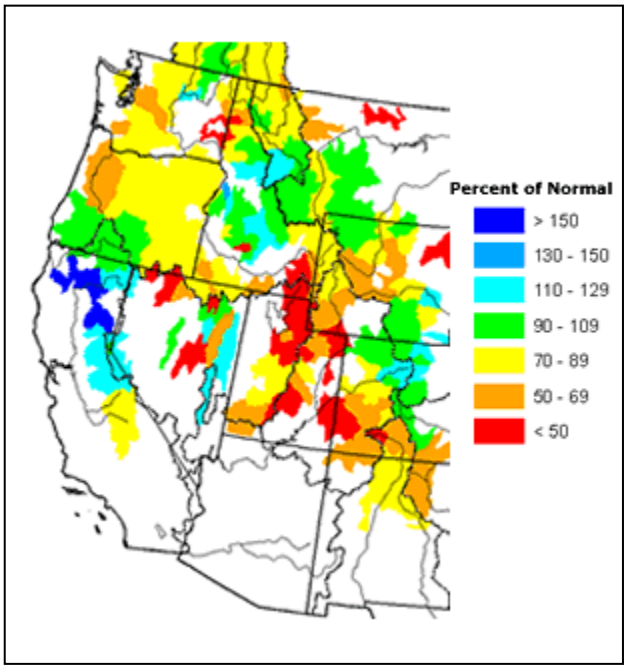

Figure 4. Snowpack through 1 May, 2003. (*from Natural Resources Conservation Service, USDA*)

Live fuel moistures have reached or are approaching their peak in sage. Piñon-juniper ecosystems have suffered from the prolonged drought with die-back of as much as 40 percent in some parts of the Great Basin. In southern Utah, south aspects have an estimated 60-80 percent mortality. Post-green-up frost kill affected Nevada oak brush fuels in Caliente and on the Toyiabe National Forest in the Kyle Canyon area. Live fuel moisture in the southern half of the Great Basin for piñon, juniper and ponderosa pine are at levels characterized by

extreme to advanced fire behavior (based on the Nevada Live Fuel Moisture Project's Fire Behavior and Tactics table).

Drought and Insect Mortality. Prolonged drought conditions throughout the Great Basin have left fuels susceptible to opportunistic insects and disease. Tree mortality (Figure 5) from these causes is clearly evident in the following areas: southwestern and central Utah, eastern Nevada and the Sierra Front, and northern and central Idaho and parts of southeastern Idaho. These areas currently have the highest potential for large fire growth, with dead aerial and horizontal fuels causing problems under any weather scenario.

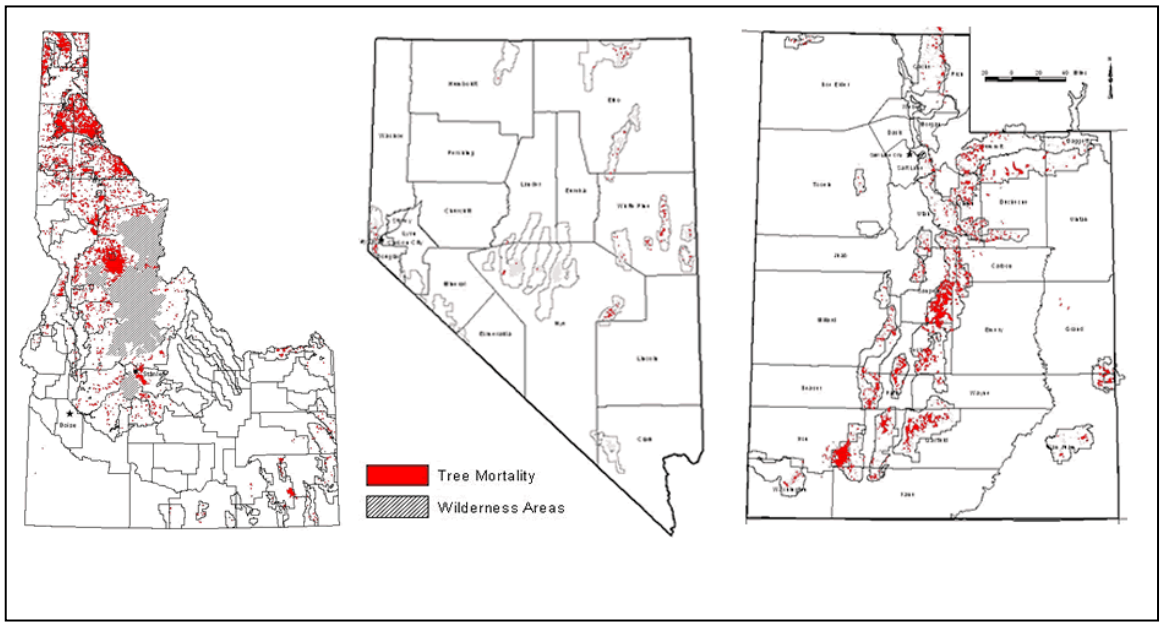

Figure 5. Tree mortality from drought, disease, and insects in Idaho, Nevada, and Utah from 1997 to 2001. (*Forest Health Protection Intermountain Region, USDA Forest Service)*

Drought induced mortality in sagebrush and juniper in Utah, Nevada and southern Idaho is just becoming noticeable and is anticipated to increase with little chance for recovery. Southern Utah and northern Arizona have experienced up to 50 percent mortality in south-facing piñon-juniper stands, and up to 25 percent mortality in ponderosa pine occupying shallow soil sites. In Nevada, sagebrush has suffered from both drought and moth infestations.

Outlooks

Climate and Weather: Climate projections for Summer, 2003, indicate the Great Basin will continue to experience warmer than normal temperatures. There is no strong consensus one way or the other for precipitation except for in northwestern Nevada where there is a small probability of below normal precipitation (Figure 6).

The values on the charts indicate the probability of occurrence of above or below normal conditions for temperature and precipitation. More simply, higher probabilities suggest a higher confidence in the forecast. These outlooks were based on several factors, including the end of the most recent El Niño episode.

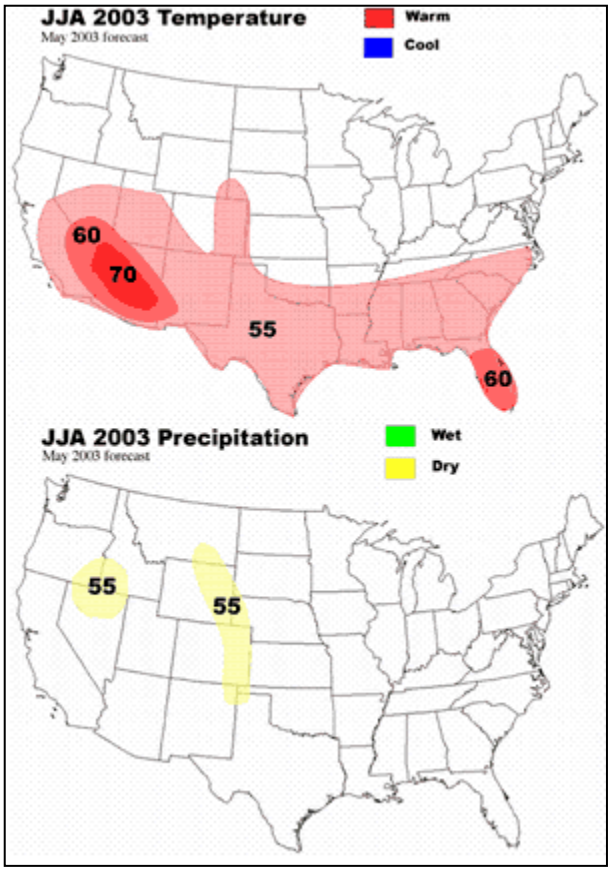

Figure 6. Consensus forecast of temperature (top) and precipitation (bottom) for June-July-August, 2003 (*2003 2003 Seasonal Assessment Workshop, Phoenix, AZ, 24-28 February 2003, updated May, 2003*)

Given this outlook, it is highly likely that drought conditions will persist across the Great Basin. Normal rainfall, as suggested by the outlooks, will certainly be of benefit, but it is not likely that normal precipitation will reverse the effects of long-term deficits. Even heavy rains will be slow to penetrate hard, compacted soils left over from several seasons of hot, dry conditions and low snow packs.

El Niño conditions observed last winter have ended and the trend in the equatorial Pacific sea surface temperatures is toward a La Niña episode. However, it is not likely this swing to the other extreme will have any significant impacts until the fall or winter of this year. The current stage in the transition typically brings a more active monsoon to the southwestern United States. Projections of moisture advection (flow) in July indicate little moisture available for significant monsoonal activity across the Great Basin. However, warm waters off the coast of Baja California and in the Gulf of California might be sufficient to produce thunderstorms over western Nevada.

Fuels: Annual grasses should cure and transition to 1-hour fuels by the end of June as precipitation becomes sparse and temperatures increase with the arrival of summer. The high fuel loadings and continuity will create a higher than normal fire potential.

Thousand-hour fuels will continue their normal drying through the summer. The hot, dry summer expected will again drive 1000-hour fuel moistures to the record levels observed in 2002. High mortality rates resulting from drought, disease, and insect infestations have produced very high fuels loadings in the larger fuels.

Live fuel moisture values are near the peak in sage and should be on the decline for the rest of the summer. Piñon and juniper should slowly increase, responding well to any influences of the monsoon in July, then drop in late July and August. However, with

little expectation of the monsoon impacting much of the Great Basin, piñon and juniper live fuel moistures will likely track lower than normal.

Future Scenarios

The 2003 fire season will likely be affected by one of the following scenarios: (1) a warm and dry summer, or (2) an unusually hot and dry summer.

Most Likely Scenario: Warm and dry summer (Probability 80 percent): In lower elevations, normal to wet spring conditions stimulated grass production across the Great Basin that has not been observed in the last three to four years. This has resulted in greater continuity of fuels and higher fuel loadings. The consequence is a dramatically higher fire potential in the elevations below 7000 feet. Fire in lower elevations is highly dependent on the availability and continuity of fine fuels. Normal to heavy fuel loads will carry fire with more extreme fire behavior with less dependency on wind as in recent years when fine fuels were stunted and sparse.

In higher elevations, high fuel loadings resulting from several years of drought stress, disease, and insect infestation will contribute to above normal fire potential. Thousand-hour fuel moistures dropped to record levels in 2002 and will follow suit in 2003. Large fire potential will be high, and extreme fire behavior with total fuel consumption will be common.

This scenario will affect large fire growth in virtually all parts of the Great Basin with the exceptions of south central Nevada, southeastern Utah, central Idaho, and western Wyoming. Large fire activity will likely show a significant increase over 2002.

Worst Case Scenario: Unusually hot, dry summer (Probability 20 percent): An unusually hot and dry summer would have the following impacts on the 2003 fire season: 1) faster drying and curing of both fine and heavy fuels, resulting in a prolonged fire season; 2) lower overall fuel moistures leading to increased fire intensity and high ignition probabilities; and 3) lower overall humidity resulting in poor overnight recovery and longer burning periods which would have adverse effects on suppression efforts.

Management Implications and Concerns

The state of the fuels across the Great Basin through early June has produced several critical implications for fire managers. The abundance of fine fuels in the lower elevations, coupled with the continuing high fire potential in the timber lands, will heavily tax resources within the region. More fires exhibiting extreme fire behavior will impact tactical and strategic decision-making, as well as pose safety concerns for firefighters and the general public.

Fire Behavior: Land managers can expect to see more large fires exhibiting extreme fire behavior and long-range spotting than in previous years as a result of higher fuel loadings, more continuity of fuels, and unprecedented fuel conditions (low fuel

moistures, high ERCs, etc.). Consequently, control will be more difficult. Higher intensity fires with more complete consumption of fuels, similar to what was observed in timber fires in 2002, will increase rehabilitation requirements.

Resources and Safety: Increased fire occurrence and severity will greatly tax firefighting resources. As the need for additional resources rises, fire managers must be cognizant of experience levels of crews and the number of individuals in new locations and positions. Fire managers and crew leaders should objectively and honestly monitor their crews' abilities and experience levels to emphasize safety and training through the season.

Daily crew briefings should include information on local fire weather and current fire behavior conditions. Specific information should include expected fire behavior, rates of spread, fuel conditions, burning index and/or energy release component, and appropriate firefighting tactics and strategies. Local pocket cards for representative fire danger rating stations should be available to firefighters.

Summary and Recommendations

Based on a consensus outlook of a warm and dry summer (June-July-August), the Great Basin is expected to experience large areas of above normal fire potential (Figure 7). The only exceptions are south central Nevada, southeastern Utah, central Idaho, and western Wyoming.

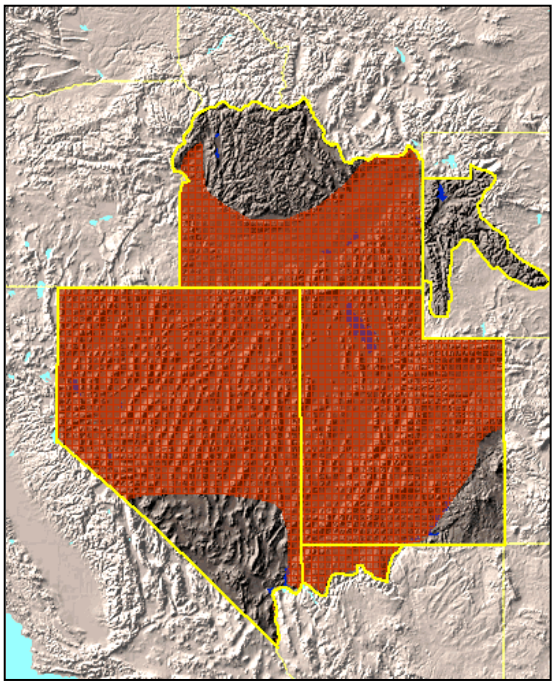

Figure 7. Fire potential for 2003 season in Great Basin, updated 18 April 2003.